



Congestion Revenue Rights Enhancements

Phase 1 Draft Final Proposal on Auction Efficiency and Revenue Adequacy

June 23, 2026

***Congestion Revenue Rights Enhancements:
Phase 1 Draft Final Proposal on Auction Efficiency and Revenue Adequacy***

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1. Executive Summary

This draft final proposal offers a modified version of the phased approach to the Congestion Revenue Rights Enhancements initiative outlined in the straw proposal published June 1, 2026. Phase 1 would still consist of expedited changes designed to be in place in time for the 2027 annual Congestion Revenue Rights (CRR) process. The Phase 1 scope would retain the modeling improvements under the existing tariff and expanded ISO authority to model loop flow in the annual CRR process from the straw proposal. However, in response to stakeholder feedback, the concept of a minimum bid and price in the CRR auction will be moved to Phase 2 for further consideration and will not be pursued further in Phase 1. This change is not a rejection of the auction floor in concept, but the ISO recognizes most stakeholders' position that this idea would benefit from more consideration and discussion than is possible in Phase 1. The auction floor idea will now be considered in Phase 2 alongside other proposals for improving auction efficiency that stakeholders suggested in the scoping phase of the initiative. Phase 2 will consider measures that require more time to fully develop and will include the product definition topics. This updated phased approach is designed to achieve improvements in revenue adequacy for the 2027 annual process while being responsive to stakeholder feedback and allowing time to fully consider more complex enhancements.

2. Introduction

The ISO's Congestion Revenue Rights Enhancements initiative has identified revenue adequacy, auction efficiency, and product definition as the three priority areas for CRR market reform.¹ In support of these priorities, this draft final proposal offers a modified version of the phased approach to policy development introduced in the straw proposal.² This draft final proposal keeps the phased structure, which is designed to balance incremental improvements that can be implemented sooner with thorough consideration of more complex structural reforms. However, in response to stakeholder feedback we modify here the scope of the first phase. Phase 1, designed to be implementable for the 2027 CRR annual process, will now include only the revenue adequacy measures from the straw proposal. These measures consist of new ISO authority to model loop flow in the annual CRR process paired with ongoing model improvements within the ISO's existing tariff authority. The proposal for a bid and price floor in the CRR auction, designed to help improve auction efficiency, will be moved to Phase 2 for consideration alongside other proposed enhancements aimed at auction efficiency.

This initiative is building on previous market improvements over the past seven years. Revenue adequacy and auction efficiency have improved since the ISO implemented the previous round of policy changes in 2019. Revenue adequacy improved from an average of 75% in the five years preceding the changes to 79% from 2019 through June 2025.³ Auction efficiency improved from 50% in the two years

¹ The full record for this initiative, including all papers, presentations, stakeholder comments, and recordings of working group meetings, can be found on the initiative's webpage: [California ISO - Congestion revenue rights enhancements](#).

² [Straw Proposal on Revenue Adequacy and Auction Efficiency](#), June 1, 2026.

³ [Issue Paper on Revenue Adequacy and Auction Efficiency Enhancements](#), page 10, January 14, 2026.

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preceding the changes to 67% from January 2019 through June 2025.⁴ Nonetheless, the CAISO CRR market still faces persistent revenue adequacy and auction efficiency challenges. The improved 79% average system-level revenue adequacy from 2019 through June 2025 reflects a total shortfall of approximately \$856 million, or about \$114 million per year.

The CAISO's February 2025 root cause analysis identified three structural drivers of revenue inadequacy: missing power flow contributions from injections below the 2% shift factor threshold, loop flows consuming transmission capacity without contributing to congestion rent collection, and divergence between the CRR network model and the day-ahead market, particularly from outage timing misalignment.

The CRR working group also identified auction efficiency as a priority area with significant variation in stakeholder perspectives. Some load-serving entities, the ISO Department of Market Monitoring (DMM), and the California Public Utilities Commission (CPUC) Energy Division conjectured that the low auction efficiency stemmed from an auction design that allows participants with limited congestion risk exposure to acquire CRRs at prices consistently below their realized day-ahead value. Financial market participants and marketers contended that auction efficiency metrics fail to capture significant value streams and that improving revenue adequacy by reducing uncertainty would organically improve auction prices and efficiency.

To drive further improvement in all three key areas, this draft final proposal recommends a modified version of the two-phase structure introduced in the straw proposal. The purpose of the two phases remains the same. Phase 1 is focused on achieving incremental improvements as quickly as possible, while Phase 2 is designed for comprehensive consideration of more complex potential reforms. However, this draft final proposal modifies the scope of the phases in response to stakeholder feedback on the straw proposal.

Phase 1 will retain the revenue adequacy-focused scope from the straw proposal, which was widely supported by stakeholders. This consists of new ISO authority to model loop flows in the annual CRR process. This will be accompanied by modeling enhancements within the ISO's existing tariff authority to improve alignment between the CRR model and the day-ahead market. The auction bid and price floor from the straw proposal, aimed at improving auction efficiency, will be moved to Phase 2 in response to stakeholder requests for further consideration.

Future phases will pursue larger structural redesign continuing in 2026 and likely into 2027. The ISO will continue considering options already discussed with stakeholders and reflected in stakeholder comments. This may include combining a minimum price floor with other changes, taking into account considerations such as ensuring access to the transmission system via CRRs at a reasonable rate, providing participants with access to hedging instruments, and providing participants a venue to resell

⁴ Id. at 18.

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allocated rights that do not best fit their hedging needs. Phase 2 will also expand on the Product Definition Straw Proposal with updated time-of-use structures and storage sink flexibility.⁵

Modeling improvements would continue in Phase 2, including potentially incorporating Extended Day-Ahead Market (EDAM) Congestion Revenue Allocation (CRA) information to inform modeling and outage timing reforms. Phase 2 could also include discussion on whether outage information received after the start of the allocation process should be included in auction runs.

Several factors will need to be accounted for going forward. The ongoing evolution of the EDAM CRA framework could affect the congestion revenue the ISO has available to fund CRR obligations, and any changes developed in this initiative must be compatible with the EDAM framework. Also, the ISO upgraded the CRR software platform in July 2025, and additional modeling improvements may be achievable under existing tariff authority using this new platform.

The ISO is committed to working with stakeholders to develop policy changes that advance the goals and address the problem statements that the CRR working group identified. We appreciate stakeholders' rigorous engagement with the straw proposal. This draft proposal does not seek to resolve all of the questions the working group identified but seeks to establish a specific two-phase direction, identify where further analysis is needed, and invite stakeholder comment on the design details that remain open.

3. Stakeholder Process

In the scoping phase of this initiative, the working group identified five goals for the initiative across two key CRR market functions. These goals represent the outcomes that changes to the CRR market design should achieve and that will guide policy development throughout this initiative.

CRR Market Function: Fair allocation of transmission revenues to customers paying the embedded costs of the transmission system:

- **Goal 1:** CRRs in the auction should be priced at a reasonable approximation of their costs and the expected payout of congestion rent in the day-ahead market.
- **Goal 2:** Customers paying the costs for the CAISO transmission grid should receive approximately commensurate value for payouts made to CRR rights purchased in the auction when considering all demonstrated value provided by entities purchasing CRRs in the auction.

CRR Market Function: Allow hedging costs of congestion in the context of a day-ahead energy market:

- **Goal 3:** The CRR market's products and processes should facilitate the ability for participants to obtain effective hedging tools and maintain the hedging value of CRRs to the extent possible, including by minimizing divergence between the CRR model and the day-ahead market model.

⁵ [Issue Paper and Straw Proposal on Product Definition](#), December 12, 2025.

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- **Goal 4:** Day-ahead energy market participants exposed to congestion risk should be able to hedge that risk efficiently.
- **Goal 5:** The CRR market structure should support open access to the CAISO transmission system, in keeping with FERC Order 888.

The working group also identified five problem statements to guide the policy development phase. The straw proposal in the chapters that follow is structured to address each of these problem statements, particularly numbers 1 through 4.

1. **Auction revenue adequacy:** Since adoption of the 2019 policy changes, the ratio of auction revenue per dollar of CRR payout has improved from 50 cents to 68 cents. However, many load-serving entities have expressed that the benefits from the auction mechanism still do not fully justify the cost to them in foregone congestion rent allocation. Questions remain whether the auction mechanism justifies the cost to customers that pay the costs for the CAISO transmission grid in foregone congestion revenue.
2. **Participant contribution to fair allocation:** Based on market results, it is unclear to what extent all CRR auction participants contribute to the fair allocation of transmission revenues. Particular focus of reforms should consider whether the congestion revenues received from different types of auction participants are commensurate with (A) their funding of the transmission system, (B) their payments for auction CRRs, and (C) other hedging value received by physical market participants.
3. **Model divergence and revenue inadequacy:** Divergence between monthly CRR modeling outcomes and day-ahead market outcomes contributes to revenue inadequacy that reduces the value of CRRs as a hedging tool. CAISO should evaluate and where feasible adopt measures for reducing this divergence, including those related to loop flows, shift factors, and transmission outages. Reform measures should align with Congestion Revenue Allocation methodologies and consider the most accurate information of transmission use from neighboring balancing authorities.
4. **Shortfall allocation methodology:** The method for allocating revenue shortfalls should strike the best balance practicable between allocating congestion revenue back to transmission customers and maintaining the hedging value of CRRs, while recognizing the evolving congestion revenue allocation on external constraints. Allocation of revenue shortfalls should be guided by cost causation principles.
5. **Evolving hedging needs:** Hedging needs are evolving alongside the composition of the ISO BAA's generation fleet. The products available in the CRR market and the processes by which they are distributed should be updated to match evolving hedging needs. This could include revisiting time-of-use periods, developing measures to facilitate hedging of congestion risk associated with storage charging load, and revisiting the auction schedule.

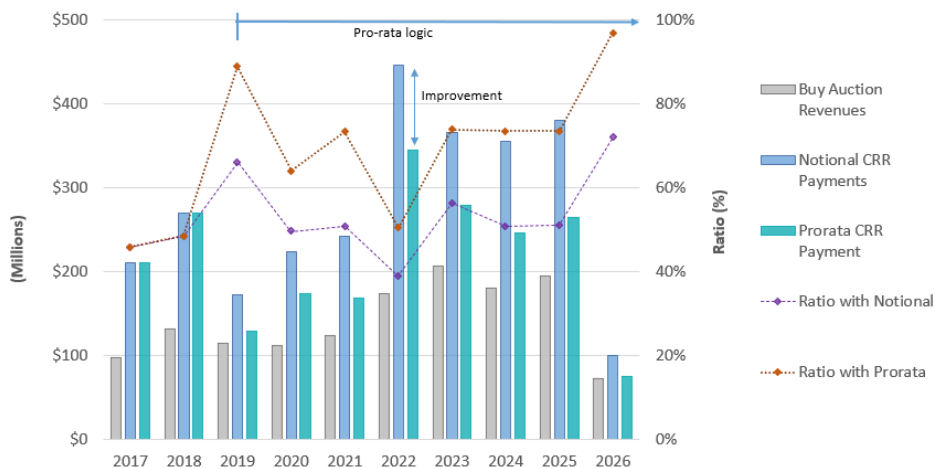
4. Draft Final Proposal: Phase 1 CRR Enhancements

4.1. Background

Historical Auction Efficiency Outcomes

CRR auction efficiency averaged about 67% from 2019 through June 2025, an improvement from pre-2019 auction efficiency of 50%.⁶ The pro-rata revenue shortfall allocation methodology implemented in 2019 reduced payouts by over \$530 million, improving auction efficiency by driving down the difference between revenues and payments. Excluding the shortfall allocation, auction efficiency averaged 50% over the same time period, similar to the pre-2019 results. These efficiency outcomes highlight underlying auction efficiency questions that will be in scope for this initiative. Additionally, over time, CRR purchasers may better predict the pro-rata logic’s revenue impacts and compensate by bidding less for CRRs, reducing the auction efficiency.

Figure 1: Auction Efficiency from 2019-2026



Historical Revenue Adequacy Outcomes

Congestion rents collected in the day-ahead market have been consistently below the notional value of the CRRs allocated and auctioned by the ISO. From 2019 through June 2025, system-level revenue adequacy averaged 79%, with a total shortfall of \$856 million, or approximately \$114 million per year. Prior to 2019, revenue inadequacy was allocated to measured demand (load-serving entities and

⁶ [Issue Paper on Revenue Adequacy and Auction Efficiency Enhancements](#), page 18, January 14, 2026

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exports). Since the 2019 policy changes, revenue inadequacy has been allocated to CRR rights holders via the CRR1b methodology on a pro-rata, constraint-by-constraint basis.

Revenue adequacy has varied significantly across different constraints. In our previously shared analysis, three constraints with the largest documented shortfalls are the Moss Landing–Las Aguilas 230 kV constraint, the San Bernardino–Devers 230 kV constraint, and the Palo Verde intertie constraint.⁷ Together they account for more than \$174 million in shortfall as documented in the root cause analysis for the 2019–2024 period.

The Moss Landing–Las Aguilas 230 kV constraint recorded a \$70.3 million deficit on \$302.9 million in notional CRR value from 2019–2024, reflecting only 76.8% revenue adequacy despite being among the most consistently congested paths in the system. The San Bernardino–Devers 230 kV constraint achieved only 44.5% adequacy over a concentrated four-month outage episode that drove a \$53.0 million deficit. The Palo Verde intertie constraint had a \$50.9 million deficit attributable primarily to outages submitted after the applicable CRR auction deadline.

These outcomes translate directly into pro-rata haircuts on CRR positions ranging from 14% to 72% — and in tail cases exceeding 100%, resulting in settlement reversals that transform CRR revenue streams into payment obligations. Approximately 4% of all CRR payments system-wide result in reversals, with the distribution highly concentrated on specific chronically inadequate constraints.

Root Cause Analysis Findings on Revenue Inadequacy

In February and March 2025, the ISO shared with the working group a root cause analysis of the contributors to revenue inadequacy in the CRR market since the 2019 policy changes. The analysis identified three leading structural causes.

Shift Factor Threshold

The ISO's day-ahead market uses a 2% shift factor threshold: injections whose shift factors on a given constraint fall below this threshold are not modeled. The CRR model does not use a shift factor cutoff. This asymmetry causes the settlement process to exclude injections that collectively contribute substantial flow to binding constraints, systematically understating congestion contribution in the settlement calculation.

Stakeholders broadly agreed that the shift factor threshold is a high-priority area for reform. However, the ISO's market AC powerflow optimization and timing limitations limit the ability of the ISO to adopt near term solutions in these areas.

Loop Flows (or parallel flow)

Loop flows use transmission capacity without contributing to congestion rent collection. If not adequately accounted for in the simultaneous feasibility test, loop flows can cause the ISO to release more CRRs than can be funded by congestion revenue. The ISO currently indirectly accounts for loop flows through the global derate factor applied in CRR processes. The global derate factor is fixed while

⁷ [CAISO Root Cause Analysis presentation](#), slide 88, February 27, 2025.

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loop flow patterns have significantly different impacts on specific CRR paths. Stakeholder comments in the working group broadly supported enhanced loop flow modeling with more granular assessment in the monthly and annual processes of expected loop flow impacts. We note as well that the amount, impact, and patterns of loop flow could change either as the EDAM footprint expands or as CRA enhancements are finalized. The Phase 1 enhancements described in the following section will include increased authority for the ISO to consider loop flow in the annual CRR process.

Model Differences Between the CRR and Day Ahead Markets

Any differences between the CRR and day-ahead markets can also contribute to revenue adequacy. For example, transmission outages that occur in the day-ahead market after the relevant CRR auction has already cleared can reduce available transmission capacity below the level the CRR model assumed. These differences directly affect the revenue adequacy of the allocated and auctioned CRRs. Reducing divergence between the CRR model and the day ahead market outcomes will be a focus of both proposed phases of the proposed initiative structure.

4.2. Stakeholder Feedback on the June 1st Straw Proposal

On June 16th, 19 stakeholders submitted comments on the straw proposal and June 2nd stakeholder meeting. With some significant exceptions discussed below, the comments showed most stakeholders coalescing around three points:

- 1) **Most stakeholders supported or did not oppose the phased approach in concept.** The idea of having avenues for both quicker incremental progress and thorough consideration of more complex structural reforms was well received.
- 2) **All stakeholders supported or did not oppose the proposed Phase 1 revenue adequacy measures.** These measures include expanding the ISO's authority to conduct loop flow modeling into the annual CRR process and continuing to explore modeling improvements that fall within the existing tariff.
- 3) **Most stakeholders opposed including the auction bid and price floor in the Phase 1 scope.** The reasons for this opposition ranged from insufficient stakeholder process despite conceptual support for the floor to full opposition to the idea.

The exceptions on the first point came from Bay Area Municipal Transmission Group (BAMx), DMM, and Pacific Gas and Electric (PG&E). These stakeholders preferred to move directly to development of a durable, long-term solution rather than have a Phase 1 focused on incremental progress. In some cases, they expressed concern that pursuing incremental auction efficiency improvements in Phase 1 would absorb momentum and ultimately increase the timeline for implementing more comprehensive enhancements.

On the second point, there was no opposition to the proposed Phase 1 revenue adequacy measures. Southern California Edison (SCE) requested an additional workshop to discuss details of the proposed loop flow modeling. Some stakeholders emphasized that, while helpful, the proposed Phase 1 revenue adequacy measures were insufficient by themselves. The comments highlight some of the additional

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enhancements these stakeholders are most interested in. The most-cited measure was addressing the impacts of the shift factor threshold, raised by Calpine, Shell Energy, the Six Cities, TransAlta Energy Marketing U.S. (TEMUS), and the Western Power Trading Forum (WPTF). Finally, several stakeholders reemphasized the importance of coordination with the Congestion Revenue Allocation (CRA) initiative and cited the impacts of CRA and the EDAM launch as significant sources of uncertainty in the CRR market.

On the third point, there were two exceptions to the position opposing the auction floor's inclusion in Phase 1. The CPUC Energy Division and the Northern California Power Agency (NCPA) both supported advancing the bid and price floor in Phase 1. They saw it as an incremental improvement to the auction structure, and both supported the floor options of \$1.00/MWh for on-peak positively-bid CRRs, \$0.25/MWh for off-peak positively-bid CRRs.

The stakeholders who opposed the floor's inclusion in Phase 1 did so for a variety of reasons. The most commonly cited was that the idea simply needed more time and stakeholder process for full consideration. Within that, some stakeholders requested additional analysis on how different floor options would impact auction results. Others requested clarification on certain aspects of the proposal, particularly how it would affect resale transactions. DMM and the Market Surveillance Committee (MSC) both questioned whether other approaches, such as a price floor applied to individual transmission constraints rather than entire CRR paths, might be more effective. From the process side, some stakeholders were concerned that putting a floor in place now would slow the development of more comprehensive long-term improvements to the auction structure. Finally, some stakeholders disagreed with the floor in concept regardless of timeline, preferring to focus on addressing the root causes of revenue adequacy.

4.3. Draft Final Proposal: Phase 1 Enhancements

Phase 1 is targeted for CRR year 2027 implementation and is designed to take meaningful and quick action to address priority areas. The ISO makes this updated proposal in response to stakeholder feedback on the straw proposal.

Minimum Bid and Price Floor

The ISO appreciates stakeholders' rigorous engagement with the auction floor concept. The ISO included the floor in the Phase 1 proposal with the goal of achieving some auction efficiency improvements as soon as possible without curtailing the broader conversation about auction structure. However, the ISO recognizes that many stakeholders believe additional development and discussion is warranted. In order to facilitate this, the ISO proposes removing the bid and price floor from Phase 1 and considering it in Phase 2 alongside other auction efficiency enhancements suggested during the scoping phase of the initiative. Stakeholders' feedback on the floor concept in the straw proposal forms a valuable foundation for further development in Phase 2.

Modeling Enhancements for Improved Revenue Adequacy

In light of the strong stakeholder support, the ISO will continue forward with the Phase 1 revenue adequacy measures in the straw proposal. These are to continue improving our modeling to the extent the current tariff allows, while making a targeted improvement to loop flow modeling capabilities.

The ISO has already begun modeling improvements that are supported by the existing tariff and facilitated by the ISO's move to an updated software platform in 2025. The April 22nd stakeholder meeting in this initiative and the April 27th Market Performance and Planning Forum both discussed how the ISO began applying the Global Derate Factor to contingency constraints in the CRR model in March 2026. While a single month is too small a sample to draw definitive conclusions, March saw a revenue adequacy surplus of \$1.6 million, the first monthly surplus in the last three years.⁸ The ISO will look for additional ways to improve its modeling accuracy within existing tariff authority and, as with this measure, to keep stakeholders apprised.

The ISO also proposes a tariff change to enhance the ISO's loop flow modeling capabilities. Section 36.4.1.2(vii) currently directs the ISO to consider "adjustments for possible unscheduled flow at the Interties" among other factors when determining the quantity of CRRs to release each month, known as the Monthly Available CRR Capacity.⁹ The ISO proposes to add this same language to the previous tariff section, which details the factors to consider when determining the Seasonal Available CRR Quantity in the annual CRR process.¹⁰

With this expanded loop flow modeling authority in place, the ISO will be able to introduce some loop flow modeling for the 2027 annual CRR process. This will consist of targeted, manual adjustments to some high-market-impact constraints based on historical loop flow information. In the longer term, the ISO will explore other loop flow modeling approaches, such as modeling loop flows as injections and withdrawals as opposed to constraint derates. The ISO recognizes stakeholder interest in the details of loop flow modeling and will provide more information in the future.

5. Governance Classification

CAISO staff believe that this initiative should be presented only to the CAISO Board of Governors (the Board) for decision, because any proposed tariff amendments will be limited to CAISO's balancing authority area's Congestion Revenue Rights rules.

The Western Energy Markets Governing Body has primary authority over any proposal to change or establish any CAISO tariff rule(s) applicable to the Extended Day Ahead Market (EDAM) or Western Energy Imbalance Market (WEIM) Entity balancing authority areas, EDAM or WEIM entities, or other market participants within the EDAM or WEIM Entity balancing authority areas. This scope excludes from primary authority, without limitation, any proposals to change or establish tariff rule(s) applicable only to the CAISO balancing authority area or to the ISO-controlled grid per charter for WEIM and EDAM

⁸ See slide 47 of the MPPF presentation: [MarketPerformance-PlanningForum-Apr-27-2026](#)

⁹ Tariff Section 36.4.1.2(vii): [section-36-congestion-revenue-rights-as-of-aug-3-2024.pdf](#)

¹⁰ Tariff Section 36.4.1.1: [section-36-congestion-revenue-rights-as-of-aug-3-2024.pdf](#)

Commented [HS1]: I would probably spell out these dates. April 22, 2026 ...

Commented [HS2]: Could we just say "revenue surplus"?

Commented [HS3]: Could we delete? It's a little unclear and interrupts sentence flow.

Commented [ER4]: Open to other ways of saying this. I know we're not able to do something full blown for 2027 but "limited" sounded a little underwhelming.

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Governance § 2.2.1. None of the tariff rule changes contemplated in this initiative would be “applicable to WEIM/EDAM Entity balancing authority areas, WEIM/EDAM Entities, or other market participants within WEIM/EDAM Entity balancing authority areas, in their capacity as participants in the WEIM/EDAM.” Rather, the proposed tariff rules would be applicable “only to the ISO balancing authority area or to the ISO-controlled grid.” Accordingly, the matters scheduled for decision fall outside the scope of primary authority.

While the WEM Governing Body “may provide advisory input over proposals to change or establish tariff rules that would apply to the real-time market but are not within the scope of primary authority,” no aspects of this initiative would establish or modify rules of the day-ahead or real time market. Accordingly, this initiative falls outside of the WEM Governing Body’s advisory role as well.

This proposed classification reflects the current state of this initiative and could change as the stakeholder process moves ahead. Stakeholders are encouraged to submit a response in their written comments to the proposed classification as described above, particularly if they have concerns or questions.

6. Next Steps

Stakeholder feedback in response to this paper is requested at the June 25, 2026, stakeholder meeting and via written comments due July 2, 2026.

The ISO anticipates Phase 2 discussions to be ongoing in Q3 2026 to develop broader solutions addressing the goals developed by the working group.